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The Casting and Replication of an 'Akuaba Doll' in Metal Art

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Abstract

In Africa as in many ethnic societies of the world, the value and significance of artistic art forms are largely based on traditional cultural practices. As custodians of these valued traditional beliefs, it is the priority of everyone within the community to preserve and promote this unique traditional culture including the 'Akuaba' doll. The 'Akuaba' doll in its original form has been known to be made of wood, lacks durability and therefore is not able to withstand the harsh conditions of the atmosphere for a long period. Therefore the purpose of this study is to cast and replicate an Akuaba doll in metals employing practice base and descriptive research methodologies. The results indicated that the casting of Akuaba doll in metals was durable and able to withstand the harsh conditions of the atmosphere for a longer period. It is recommended that emerging contemporary artists, researchers and students would acquire the knowledge and be able to cast and replicate other art forms into metals for the preservation and promotion of traditional art and cultural practices.

Keywords: fabrication, metal, 'Akuaba' dolls, Asante, casting

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INTRODUCTION

In Africa as in many ethnic societies of the world, the value and significance of artistic art forms are largely based on philosophy and cultural practices. Therefore as custodians of these valued traditional cultures, it is the priority of everyone within the community to preserve and promote this unique traditional culture such as the Akuaba doll as an artifact. These artifacts have become parts of the accepted spiritual objects that serve to express cultural values and art practices among the people of Ghana. (Fosu 2004; Kushiator et al 2019). Most 'Akuaba' dolls have been redesigned and rendered by many different cultures in different types of materials other than wood as the original medium of expression. The 'Akuaba' doll in its original form has been known to be made of wood, lacks durability and sustainability and therefore is not able to withstand the harsh conditions of the atmosphere for a long period.

Therefore, the main objective of this study is to cast and replicate an 'Akuaba' doll in metal that is durable and be able to stand the test of time. Based on this objective, it can therefore be justified that since metal is much more durable and with its weight not so portable, it can be appreciated as a source of knowledge in the promotion and preservation of African culture. The corresponding research question is; how can an 'Akuaba' doll be cast and replicated in a metal that is durable and capable of standing the test of time? The purpose and significance of this study is to help the younger generation to acquire more knowledge about the history, value and philosophy of their traditional art and cultural practices.

'Akuaba' Doll

This unique doll can be described as a wooden fertility doll, carried on the back by women and culturally expressive of a desired, yet unborn baby. This cultural practice can be found among the Akans of Ghana. There are basically three tribes in the Akan ethnic group of Ghana that employ the Akuaba. These are the Asante, Fante, and the Bono. The best known Akuaba are those with large disk-like heads mostly attributed to the Asante people. Aside the fertility and medicinal purposes of the Akuaba doll, it also tends to describe what exactly the beauty of the African woman entails. Many different cultures have many different types, styles and interpretation to dolls. Africans for instance employ dolls basically for teaching and entertaining. Meanwhile these dolls

also serve as supernatural intermediaries fashioned for ritual purposes. Other ethnic groups in the region, the Bono and the Fante people have their own distinct style of the doll.

The Akuaba doll is a wooden figure with distinctively precise and rigid features, happens to be one of the most important wooden carvings of the Akan Ethnic Group, especially Asante, Fante and Bono. This research would specifically be based on the 'Akuaba' doll as pertaining to the Asante tribe of the Akan tribal group. Among the Asantes to be precise, the lineage of the family passes through the female children to continue this line. The Asantes are a major tribe in the Akan ethnic group in Ghana with very rich history and culture ((Arhin, 1967; Claridge, 1915; Lentz & Nugent, 2000). As part of their rich history and culture, the Asantes own a form of art or sculpture popularly known as the 'Akuaba' In their local dialect which literally means Akua's child. This doll is characterized mainly by its attempt in the invocation of fecundity gods to give birth for a child. Giving birth to a child is an extraordinary rite of passage for a Ghanaian Akan woman. They are recognised also for their meaning of beauty. Meanwhile, it is sometimes used for medicinal purposes (Odwirafo, 2015; Nyarko, 2015).

Apart from the Asantes, there are also two other tribes also from the same Akan that patronize the piece. Those are the Bono and the Fante. The dolls of these other two tribes are mostly similar and different from that of the Asantes. The types of dolls are differentiated based on the design of the heads (Segy, 1963; Wolff, 2004). Whilst the head of the Asante dolls are round, flat and disk-like in shape, those of the Fante and Bono come in angular forms or shapes like a rectangle. The symbolism of the strongly exaggerated and emphasized parts of these dolls is specific regardless of their differences. In the case of the Asantes, the flat, disk like head satisfies the concept of the Akan notion of beauty. Also, the standard ringed neck stands for conventional rolls of fat, which represents beauty and prosperity. They come approximately between 20cm and 40cm in height.

By inference, the Asantes, the Bono and the Fante people are the only tribes in the Akan ethnic group that employ the 'Akuaba doll'(Kugbonu et al, 2020). Most of them are the most ancient and traditional ones after which a number of duplicates have been made

by some contemporary artists. With the duplicates of these dolls, not only have the features been tempered with, but have been rendered in different materials other than its original hard wood known as 'sese'.

Casting

Casting basically is a metal forming technique by which molten metal is poured to fill a cavity known as mould made with a pattern called model to take the shape or form of that cavity (Kisi et al, 2019). This process remains the main technique considered for the production of the replica 'Akuaba' doll. Not so different from the above definition, Casting comes in different categories such as centrifugal casting, and die casting. Others are lost wax casting, shell mold casting and sand casting.

The lost wax casting is a manufacturing process in which a wax pattern is covered with refractory ceramic materials known as investment powder or Plaster of Paris (POP) or a clay composition of charcoal, cow dung or fiber, with a considerable amount of water to mix. The term lost wax casting is often used interchangeably or goes in hand with investment casting (Fox, 1988; Effah, et al, 2019; Asante, et al, 2019; Kissi et al, 2019)

Meanwhile, investment casting is an improved version of the traditional lost wax casting. These two methods can be said to be the same depending on the fact that they all use wax pattern as a model. In a different context, they can be said to be different because they all use entirely different materials for their moulds. The investment casting uses Plaster of Paris whereas traditional lost wax casting utilizes the clay composition mentioned above. Once the investment powder or the clay composition (whichever one was used) hardens, its internal part receives the molten metal, thus determining the shape of the casting.

METHODOLOGY

The study employed practice-based and descriptive research methodologies. The practice-based research can also be referred to as artistic or studio-based research. Studio-based research has been described as the belligerent body of thought which offers an alternative in its search for knowledge. Although this study is studio-based, the researchers also had to rely on a descriptive research approach in other to

authenticate the data and the findings. The nature of the research topic required that the researchers visit centres where they could see samples of 'Akuaba' doll, examine, analyze and describe them as to which tribe they belong. The result of a study is the end result of the decision made by the researcher concerning how the study is conducted (Burns and Groove 1997).

Justification of Research Tools

Just like any other form of research, the right research tools may be a catalyst to get the study to its peak. These research tools included interview, focus group discussions, observation and questionnaire. The tools are basically a means of obtaining relevant information for the research project. Thus, authenticity of gathered information may be dependent upon them. In this study, the tools used are; interview and observation. In this study, semi-structured interviews were adapted as a means of collecting data for this research. Face to face interactions with some resource personnel and some elderly people at Manhyia palace and the cultural centre were also held. Observation; the researchers observed the working process of producing the 'Akuaba' doll at the cultural center. Also observations of some basic metal forming techniques especially lost wax casting were observed at Krofrom. These observations were recorded and utilized appropriately.

The Design Process

Unlike the traditional craft man, almost every metal artist regarding the type of works they want to produce, prefer creating a new design from the scratch and produce from start to finish. With this research topic, there is an understating to using pre-existing design ('Akuaba' doll) thus reproducing it in a different medium other than the original. After getting the above in place, the next thing that needed to be done was to determine the size to which the work was to be produced. Verify from plates 1-2 below. The actual size of the work was blown up from one (12inches) to fit two feet (24 inches) for the working drawings and rendering of the 'Akuaba' doll as displayed in figs. 1- 6

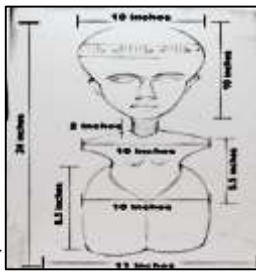


Fig.1. working drawings.

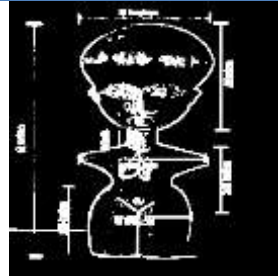


Fig. 2. working drawings



Fig. 3 working drawings



Fig. 4. rendering model



Fig. 5. rendering model



Fig. 6. rendering model

The Fabrication Process

This section of the paper highlights how the Akuaba doll was executed in metal. The process was in four (4) parts; making of the wax model, mould making, shooting the molten metal into the mould and its finishing.

Making of the Wax Model

To make the wax model, bees wax was softened in hot water. A pattern was then made by way of building wax by up carving or sculpting and pressing to suit the shape and form of the doll taking the working drawing into consideration. This was done by using the modeling tools. The pattern was built in four parts; the main body, the neck, head and the breast.



Figure 7; the body



Figure 8; the neck



Figure 9.0; the breast



Figure 9.1; the head

The above figures are all patterns and not the actual model. And yes, they were all made in wax too. Now the next step was to make the actual model from the patterns. In making the actual model, the patterns were put in cold water for some time in order to harden them. When they were hardened well enough inside the cold water, they were removed and a parting material specifically saliva was applied all over them with the fingers. They were done one after the other anyway. Thereafter, wax was made into sheet and wrapped around them and pressed to take their form. The saliva is supposed to serve as a parting material to part the wax sheet away from the patterns since it was going to be cut open and welded separately from them. The reason for this is because the wax model was to be made hollow. See images below;



Figure 9.2; pattern being hardened in cool water



Figure 9.3; making a wax sheet



Figure 9.4; pattern being wrapped with wax sheet



Figure 9.5; dressing wax sheet around pattern



Figure 9.6; smoothing wax sheet on pattern



Figure 9.7; splitting wax model by cutting with a blade



Figure 9.8; detouching wax modle from pattern



Figure 9.9; splitted wax modle



Figure 10.0; welding detouched wax modle together



Figure 10.1 tacking the modle with wax rods



Figure10.2 finished and assembled model

It should be noted that the amount of metal (aluminum) to be used in the casting was calculated with the model before it was covered for the mold. The next sub-heading is dedicated to that since it is also as important as finishing this project.

Calculating the Amount of Aluminum Metal Needed for Casting

Knowing how to determine the correct metal weight for casting ensures the right amount of metal for the cast. It makes the casting process more cost-effective and more reliable. Below is how the researchers did their calculation. First, knowledge of the specific gravity of the metal, in our case aluminum which is 2.72, is needed. The wax model was weighed along with the gate sprues. An additional 10% of the wax model's weight was added to account for any mishappenings. The total was multiplied by the specific gravity of the Aluminum. See the mathematical calculation below.

CALCULATION OF THE AMOUNT OF METAL NEEDED

weight(w) of wax model and sprues gates=220g

addition for mishapening= $10 / 100 \times 220g = 22g$

gross weight (gw) = $220g + 22g = 242g$

Amount of metal = gw x sg of aluminum

where gw = 242g

sg = 2.72

;- amount of metal = $242g \times 2.72$

amount of metal = 658.24g

therefore 658g of Aluminum was used

Making of the Mould

A mould is a cavity which contains an exact detail of a model where molten metal is shot to take the form. This is basically the next thing that was done after calculating the amount of aluminum to be used. Making of the mould were made in three stages; first, coating the wax model with a fine charcoal powder slip (first coating), second coating and then the third which is where clay and fiber are mixed to cover the entire previous coatings. Below is how the exercise was executed. Meanwhile the materials that were made use of are charcoal, clay and fiber. The fingers as a tool were also utilized here.

First Coating

That is the immediate coating that was done. It was started by pounding charcoal to powder and sieved with an 80 mesh. Actually, the mesh type depends on how coarse or fine the powder is wanted. Also the appearance of the cast piece, that is the surface is influenced by this issue. The coarser the charcoal powder, the rougher the surface of the cast piece becomes. The higher the mesh grade, the smoother or the finer it is. For this project, the researchers went in for a very smooth mesh since the surface of the casted pieces were to be made smooth. After making the charcoal powder, four parts (4pts) of it to one part (1pt) of fine clay was mixed with a considerable amount of water into a slurry form and to an even consistency. The figures below explains it more.



Fig.10.3 sifting charcoal with seive Fig.10.4 charcoal mixed with water. Fig. 10.5 charcoal, clay and water

At this stage, the composition was ready for the first coating. As said earlier, the first coating is done twice. The reason for this is because since the composition is slurry, it is not able to immediately stick to the wax model unless another layer is added on to it. Therefore, the wax model, as it has been divided into units, were coated individually with the prepare mixture. Before this is done, the wax model must have been in cool water for it to get more hardened. Upon completing the first part of the first coating, the units were made to remain under the sun until they all dried up completely. The second part of the first coating was then done. Again, they were put back under the sun to dry up. The mold was always dried up in air before it is put in the sun. This is because rapid drying may cause cracks in the mould.



Fig. 10.6 Coating the model

Fig. 10.6 first coating of the head

Fig. 10.7 first coating of the body

Second Coating

In the second coating, the same composition was used but this time a little coarser and thicker than the first one. In the first coating, the model was dipped inside the slurry but in the second stage, the composition was hand scooped and applied on till every part was covered evenly. With this second coating, there is no limit to the number of times of application. Depending on the size of the work, one can decide the number of times one wants it. Considering the size of our Akuaba doll which is 24 inches, happening to be quite large, it was coated five (5) times. See Images below



Figure 10.8 prepared slurry for the second coating



Figure 10.9 first stage of the second coating



Figure 11.0 second stage of second coating



Figure 11.1 third stage of second coating



Figure 11.2 fourth stage of second coating



Figure 11.3 the head in second coating

Filling in the Hollow Part of the Wax Model: Making the Core

The core is the solid clay and charcoal part invested in the mould to create a cavity in the cast. That is what ensured that the piece remains stable during casting. The process of filling in the hollow part of the wax model is also the same process by which the core comes about. They move hand in hand. In doing this, a new composition just like that for the second coating was prepared but this time only fresh charcoal and clay were used. This made it some what easier to break the core when retrieving the piece after the cast. It should be noted that it was very ideal to add a lot more of grog to the composition for the second coating. This made the mould very strong. Grog is basically

an already used mould which has been grounded and sifted. It is a refractive material and it gives strength to the mould. After filling in and making the core, it was time for the researchers to set the sprues and do the last coating. It is described below.



Figure 11.4 the core to be filled



Figure 11.5 core filled in

Spruing Process: The Last Coating

The wax model was sprued with a treelike structure of wax rods that eventually provided paths for the molten Aluminum to flow and also allow for air to escape. The carefully planned spruing began at the top with a wax "cup," which is attached by wax cylinders to various points on the wax model. The spruing does not have to be hollow, as it will be melted out later in the process. Proper placement and attaching of sprues by the researchers gave a hope of reliability since it is one of the most important factors in achieving a successful casting. Below is some pictures to verify the spruing process. After spruing, the sprues were also covered with the same mixture for the first and second coating to the point of the main mould before the third coating (clay, sand and fibre) was attached to it.



Figure 11.6 Making of a wax rod



Figure 11.7 Rolled wax rod



Figure 11.8 Scribbing area where sprues will be attached



Figure 11.9 scribed mould



Figure 12.0 Setting sprues



Figure 12.1 Tree-like structure of sprues



Fig 12.2 Softening sprues using heat Fig. 12.3 making gates and air vents Fig. 12.4 Complete structure.

The Last Coating: At this time, the piece was ready to be coated with another composition of a considerable amount of clay, fiber, grog, sand and water into a form of a thick paste. The mixture was prepared by pounding the materials with pestle. It was made malleable, wedged and kneaded with the feet and fingers respectively. When the mixture was ready, it was hand picked and pasted on to the black mould just like how the second coating was done until every part of the black mould was fully covered. Without forgetting the wax sprues, they were also covered nicely leaving a gate at the top where the molten aluminum would be poured. Below are images throwing more light on the above.



Fig. 12.5 coating mixture. Fig. 12.6 mixture preparation. Fig. 12.8 Complete Mould. Fig.12.9 Dewaxing

The above illustrates the stages of mould making. The completely covered wax model was left to totally dry up at a room temperature in order to prevent cracks. Figure 12.7 is the completed mould. Dewaxing (burning out), pre-heating, melting of aluminum and shooting of the metal into the mould comes beneath.

Dewaxing, Pre-heating, Melting and Shooting of the Metal into the Mould

Dewaxing is basically a stage where the wax was made to melt, evaporate or flow out of the ceramic shell-coated mould. The ceramic shell-coated piece was placed cup-down in an open fire kiln. The temperature of this kiln was irregular. Its heat hardened the coatings into a shell and at the same time melting the wax to run out. This wax could be collected and reused if desired. Now all that remains of the original artwork is the negative space previously occupied by the wax, inside the hardened ceramic shell

Pre-heating, Melting and Pouring of the Aluminum into the Mould

The pre-heating is where the dewaxed mould is still left in the kiln to be further heated whilst the metal was being melted. This process ensures an easy flow of molten metal and prevents it also from unnecessary cooling. With the pre-heating for this work, it was made to be come red hot. As the mould was being pre-heated, the aluminum had been cut into smaller units, washed, fluxed and put into an iron crucible inside the heated furnace.

Pouring of the Aluminum into the mould; by the time the aluminum got melted, the mould was well heated enough to receive it. In no time, the molten metal was fetched gradually with a small iron container and then shot into the mould which had been positioned upright by holding it with tongs. Because of the size and weight, it was held by two people. The molten aluminum was poured into the mould until it was entirely

full. It was left for some few minute to cool off a little before breaking the mould. See images below.



Figure 13.0 Melting Aluminum



Figure 13.1 pouring Aluminum

The After-casting Process and Finishing

The after-casting process has been categorized under i; breaking the mould, ii; cutting the sprues, iii; welding parts together and iv; grinding. Breaking the mould; after the metal had been filled into the mould, it was left to cool off a little for sometime before quenching in cold water. It was not advisable to quench it whilst it was still red hot. This was to avoid any possible cracks due to rapid change of temperature. A hammer was also used in breaking parts of the mould especially the core. By so doing the cast piece was retrieved. Despruing; the cutting of the sprues was necessary. So therefore, the hacksaw was carefully used in removing the sprues fins and other unwanted attachments.



Figure 13.2 retrieved cast pieces



Figure 13.3 welding pieces and filling holes

Welding parts together and filling unnecessary holes; as said earlier, the model was casted in parts. It was another task and a great experience joining them together. After

joining, it was grinded using the hand grinder. This was to ensure there is no unwanted bumps on the surface before the actual polish

Finishing of the Cast 'Akuaba' Doll

The Akuaba doll was finished by way of sanding with abrasives and enhancing the surface integrity of the cast by filling in all unnecessary pinholes that could not be covered by the aluminum welding. It was then sprayed with an F1 Aerosol silver spray paint and lacquered with a transparent lacquer. It was left to dry under the hot sun. The images as labeled below show the processes and the finished Akuaba doll.



Figure 13.4 the head



Figure 13.5 welding body and head



Figure 13.6 Completed work

RESULTS AND DISCUSSIONS

Casting and Fabrication Process

The results from the studio practice indicated that the replicated 'Akuaba' doll in metal would be able to withstand the harsh conditions of the atmosphere for a longer period. The idea of designing and replicating an Akuaba doll in metals was developed from the desire to use a lighter and more durable material to preserve some cultural totems hence the choice of aluminium to ensure durability and sustainability of the Akuaba doll. The results from the studio practice also indicated that aluminum when molten in an iron crucible in a furnace can break it. When this happens, it causes a spillage of the molten aluminum into the furnace. As a result, the iron crucible is not just put in the furnace when aluminum is to be melted rather a mixture of the third coating as mentioned earlier in the previous chapter is used to clad the iron crucible before it is put on fire in the furnace.

The results again showed that it is not all cores that require cowdung for easy removal as it has been thought by some schools of thought. The core as described early on, is the material that is invested to create the hollow part of the finished cast piece. This is invested inside the mould. The composition for this has always been the mixture of cowdung, charcoal, a little bit of grog, clay and an amount of water for malleability. Going through this research the researchers experimented with a mixture of fine charcoal and clay for the core in place of the cowdung which worked effectively as expected.

The reason for going by this is the fact that the core needs not to be too hard to break when retrieving the cast piece nor too weak to collapse after dewaxing and pouring in the molten metal. Finally but not the least, the findings on time factor and budget of this research is worth noted. The cost effect, flexibility of time and convenience in using lost wax casting on large objects like this is conducive when the artist has a readily available and uninterrupted studio to work in.

The Concept and Symbolism of 'Akuaba' Doll

The objective of casting and replication of the 'Akuaba Doll' in metal art has been successfully demonstrated. The concept or philosophy behind the Akuaba dolls is very significant (Robertson, 2004; Labi, 2009). The philosophies imbued in the Ghanaian art forms and cultural practices are attributes that are recognized among the individuals within the society. These artifacts have become parts of the accepted spiritual objects that serve to express cultural values and art practices among the people of Ghana.

It is believed that a cultural artifact such as the Akuaba fertility doll cannot effectively function in the life of a barren woman without the participation of indigenous religious practices (Wolff, 2004; Kushiator et al 2019). The barren woman believes in her mind, that she would have a child by letting her mind be on the fact that she is going to have a child. Giving birth to a child is a remarkable rite of passage for a Ghanaian Akan woman (Odwirafo, 2015; Nyarko, 2015); for many, motherhood is the only way women get to enhance their status in the community (Dyer (2007).

Due to these conditions, people would want to have offspring at all cost, and so they go to boundless extents to fulfill that. Even though the cultural practice of carrying Akuaba

at the backs of women to conceive is not as widespread as it was in the past, the practice is still carried out in some rural parts of Ghana. It appears that there is a threat of 'Akuaba' doll's possible cultural extinction if conscious efforts are not made to protect and preserve these indigenous art forms and cultural practices for the future generations.

And again if conscious efforts are not made to replicate and preserve the indigenous 'Akuaba' doll art forms against hard weather condition, there is the predisposition of 'Akuaba' doll cultural extinction in Africa. The proper role or history is to search for the true identity of objects, for original or actual meanings found primarily in their past (Batchen, 2001). The Akan has certain peculiar and rich history that should not be compromised, but preserved and promoted.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, lost wax casting is a very delicate process and should be handled with extra care. Akuaba doll was formed with the technique of lost wax hollow casting where a hollow model was made with bees wax, coated with a ceramic material to prepare a mould into which was poured molten aluminum. It was then sanded, finished by way of spraying and fixed with a transparent lacquer.

Secondly, the philosophical appraisal of African culture and values is not only apt and timely, but also appropriate and relevant. Moreover, the significance of the place of values in African culture as a heritage that is passed down from one generation to another must be protected. It is recommended that emerging contemporary artists and students would acquire the knowledge and replicate other traditional art forms into metals for the preservation and promotion of African art and cultural practices.

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